Airborne Sunphotometry in Support of the Chesapeake Lighthouse and Aircraft Measurements for Satellites (CLAMS) Experiment, 2001

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AATS-14 aboard the UW CV-580

1. Measures direct solar beam transmission @:
   353.5 380.0 449.0 499.4 525.0
   605.7 675.1 778.4 864.5 939.7
   1019.1 1059.4 1241.3 1557.8 nm

2. Yields:
   aerosol optical depth + aerosol extinction when A/C flies profiles

   columnar water vapor (ozone) + water vapor (ozone) concentration when A/C flies profiles

3. Size:
   Telescope dome 8" OD (hemisphere) atop 5" H pedestal. (Total H: 9" above A/C skin), Inside A/C: 12" D x 18" H cylinder.

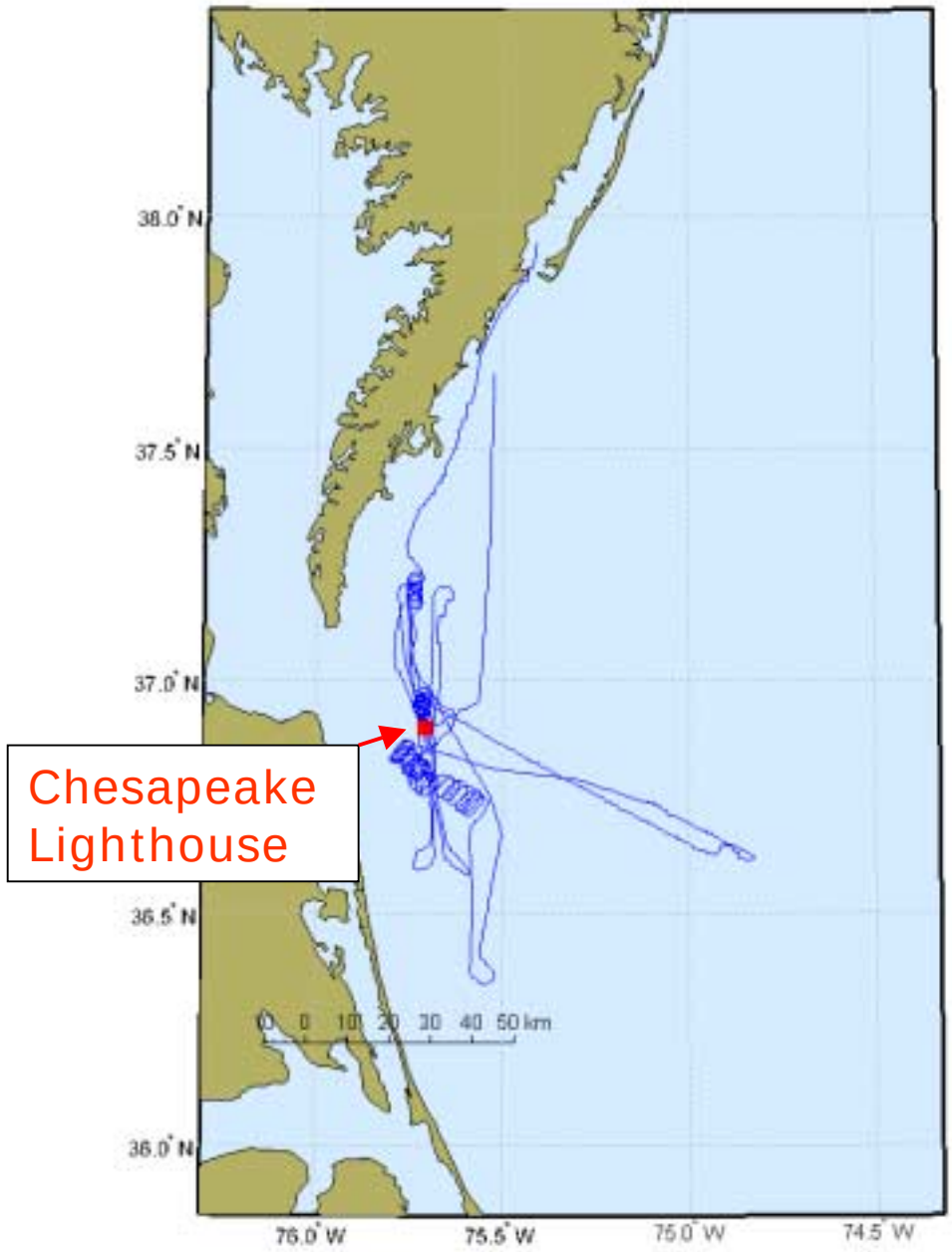
4. Weight:
   131.6 lbs

Status of AATS-14 data analysis/archiving

Date	UW Flight	Flight hours	Status / AATS-14 highlights
July 10	1870	4.92	- archivable - Run at 100 ft (for AOD) from lighthouse out to east and return to lighthouse: AOD(499nm) ~ 0.24 - Ascent to 12,000 ft over lighthouse
July 12	1871	5.63	- archivable - Vertical profile, with full chemistry, over lighthouse: AOD(499nm) ~ 0.08 - Low pass over lighthouse at Terra overpass time (1154 UTC)
July 14	1872	3.27	- archivable - Underfly Terra at COVE lighthouse at 100 ft (Terra overpass at 1542 UTC) : AOD(499nm) < 0.1
July 16	1873	3.28	- Closer look at cloud-screening required - Some runs at 100 ft between lighthouse and buoy 44014 (in intermittent cirrus) - BRDF in best cloud-free area available (still some cirrus), climbed to 10, 000 ft at this location for continous sunphotometer and in situ aerosol measurements. - Continous sunphotometer and aerosol etc measurements in profile to 100 ft on return to Wallops.
July 17	1874 AATS-14 CLAMS page	5.80	- archivable - Vertical spiral 2 nm NW of lighthouse (36 deg 57.3 min/75 deg 37.5 min) : AOD(499nm) ~ 0.4 - Run at 100 ft through location given above at time of satellite overpass: AOD(499nm) gradient 0.38 -> 0.48 in 50n.miles

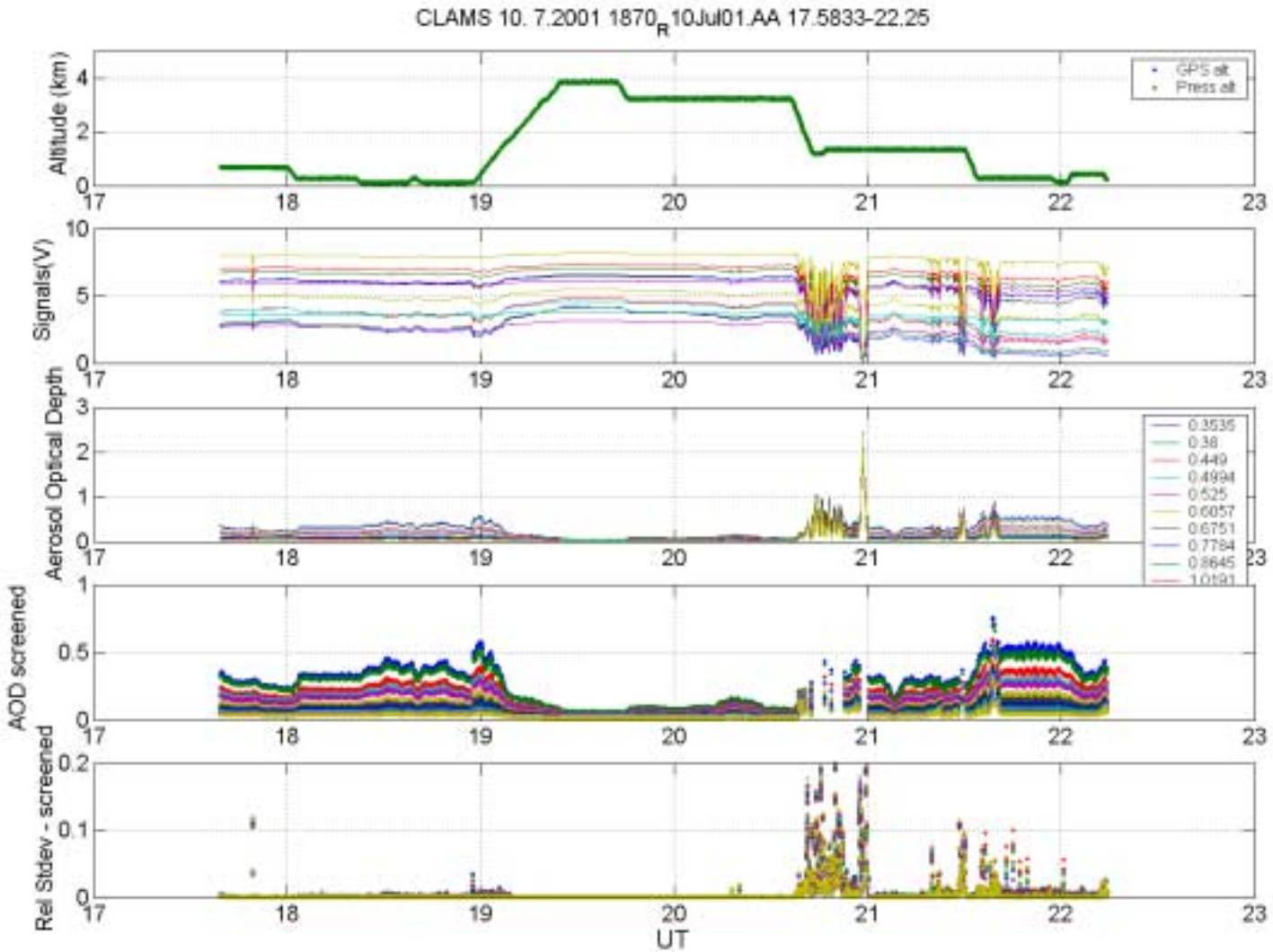
Status of AATS-14 data analysis/archiving

Date	UW Flight	Flight hours	Status / AATS-14 highlights
July 23	1875	2.92	- archivable - Underfly Terra satellite overpass at 1535 UTC in cloud free or scattered cloud conditions at least 50 miles from shore. -> extremely low AOD's (<= 0.08) + nice H_2O profile
July 25	1876	cancelled	ER-2 cancel.
July 26	1877	cancelled	UW data system
July 26	1878	3.68	- archivable - Low-level run in cloudless conditions beneath Terra satellite overpass at 1607 UTC, with 100 ft run between COVE lighthouse and buoy 44014 from 1556-1612 UTC: AOD(499nm) ~ 0.23 - Slow climb to 10, 000 ft over buoy 44014 (36 deg 34.98 min/74 deg 50.16 min) - Fast descent to 100 ft over buoy
July 30	1879	3.70	- More cloud screening required - Underfly ER-2 off coast for sunphotometer and aerosol profiles in cloud-free holes
July 31	1880	5.5	- archivable - Low-level run in cloudless conditions at 1634 -1639 UTC
August 2	1881	4.93	- archivable - Low-level run beneath Terra satellite overpass at 1613 UTC at 100 ft - two spirale profiles

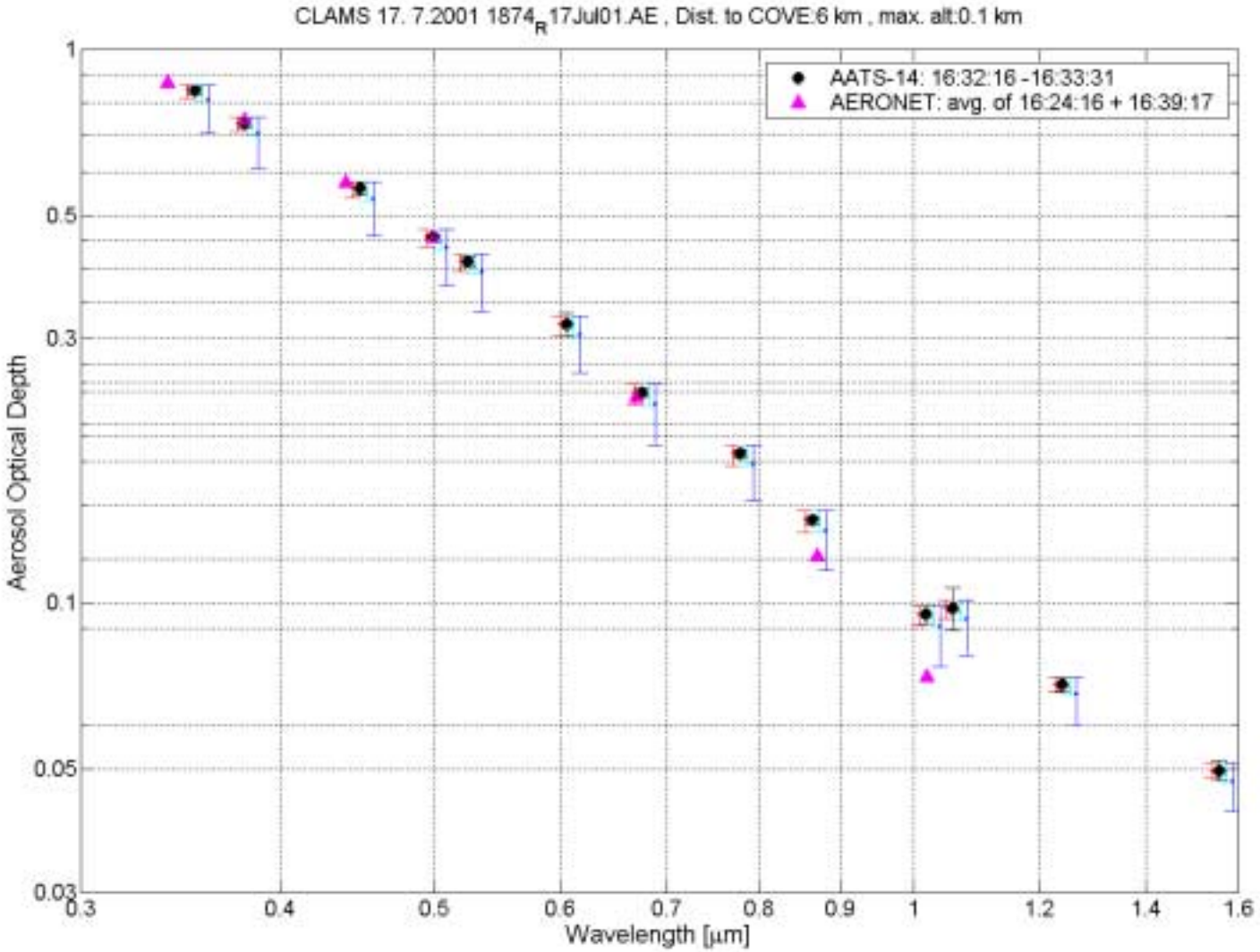


Typical UW CV-580 flight track in CLAMS

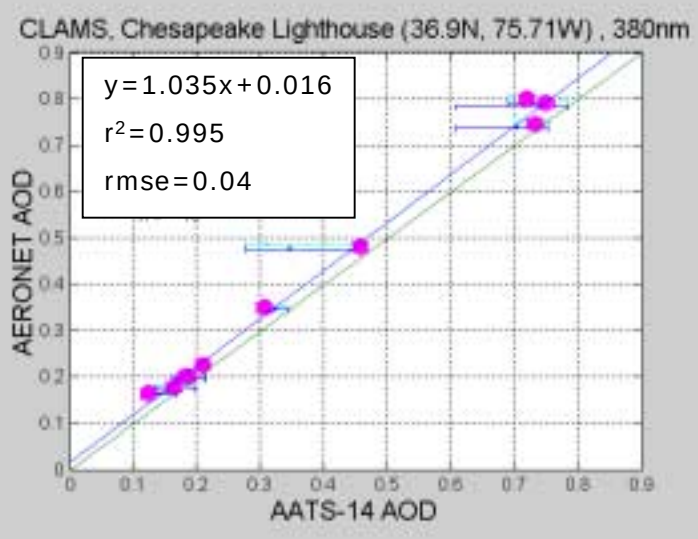
Typical AATS-14 measurement day

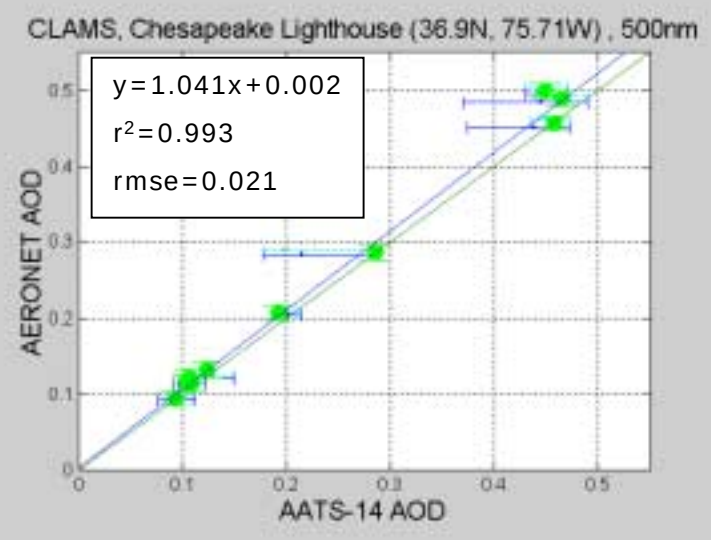


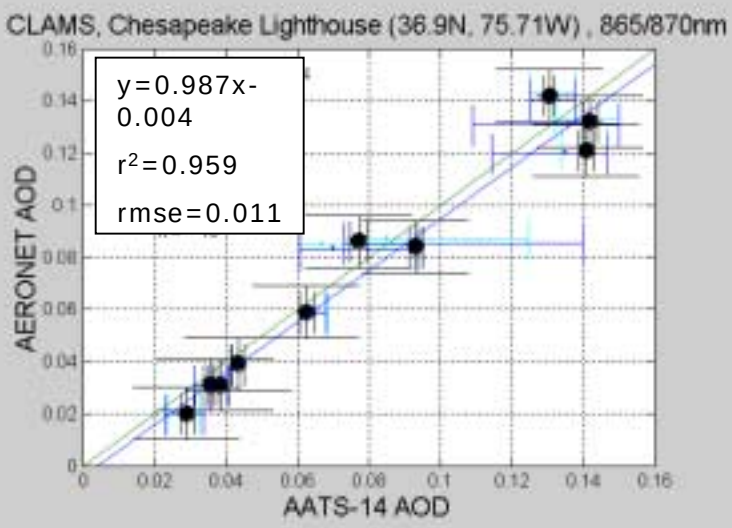
AERONET vs. AATS-14 at COVE, July 17, 2001

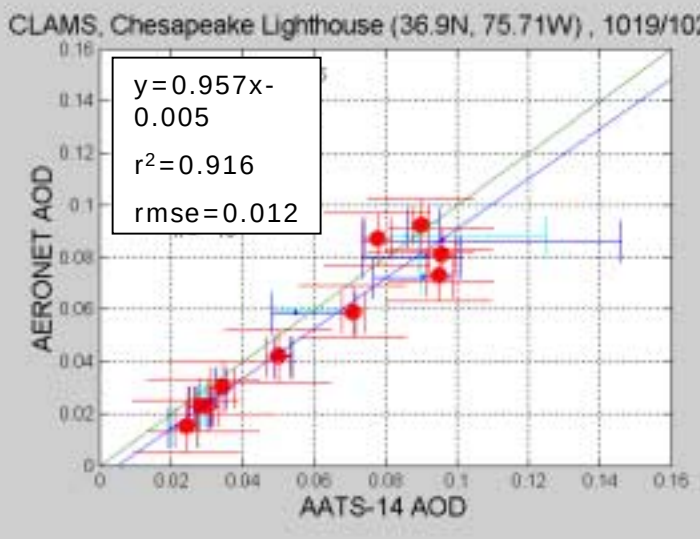


Statistics of AERONET vs. AATS-14 at COVE, July 10 – Aug.2, 2001

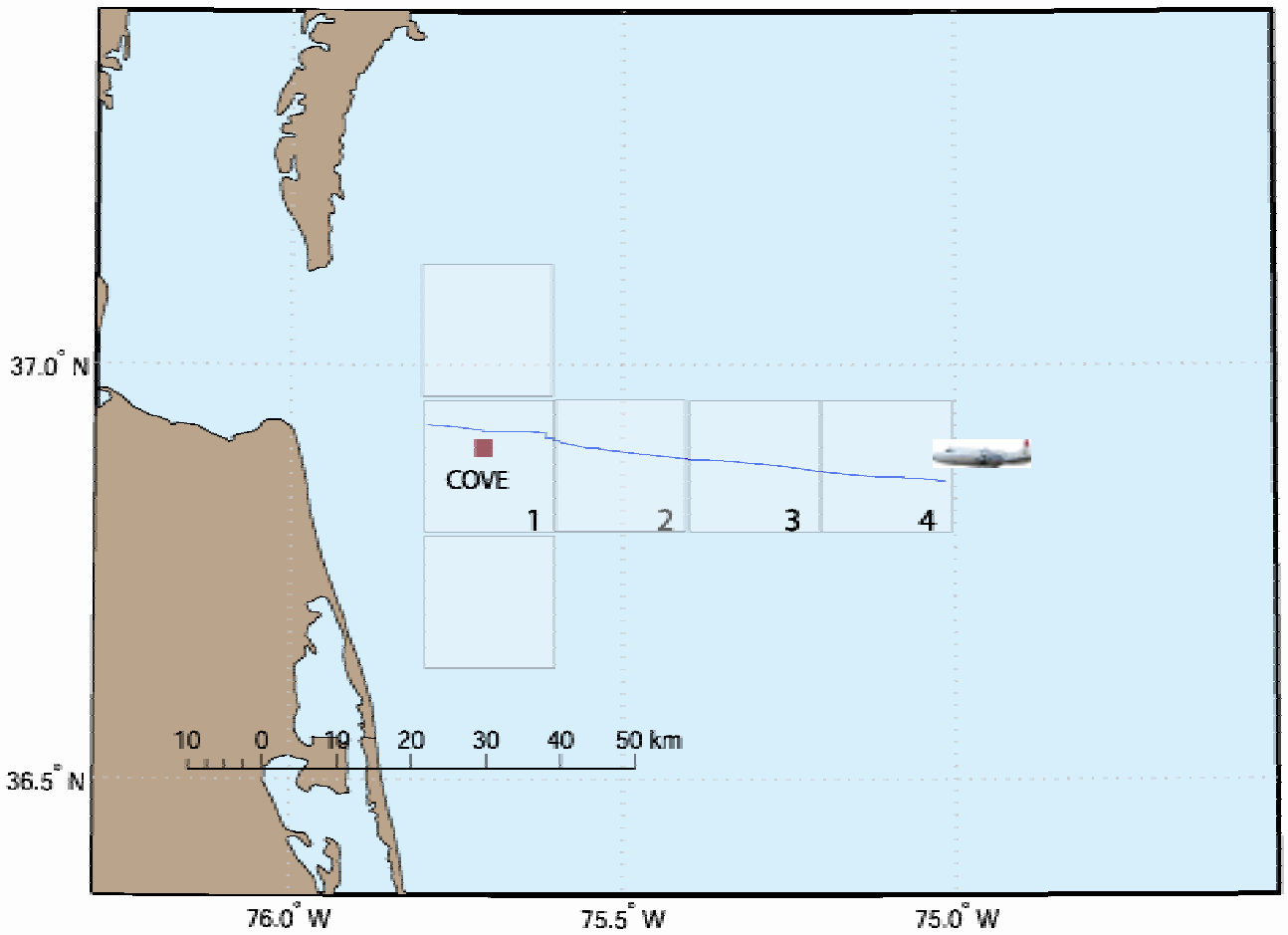




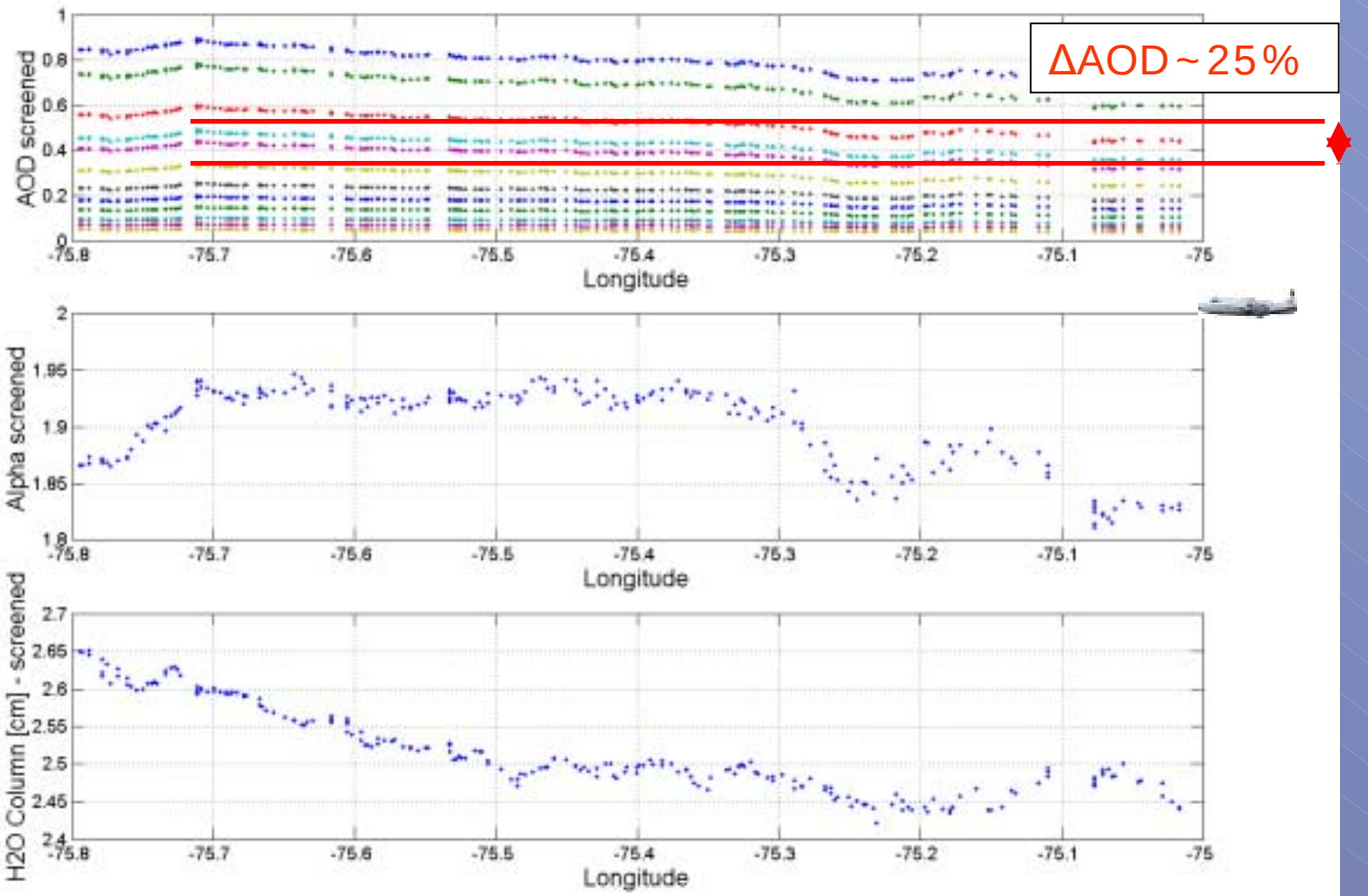




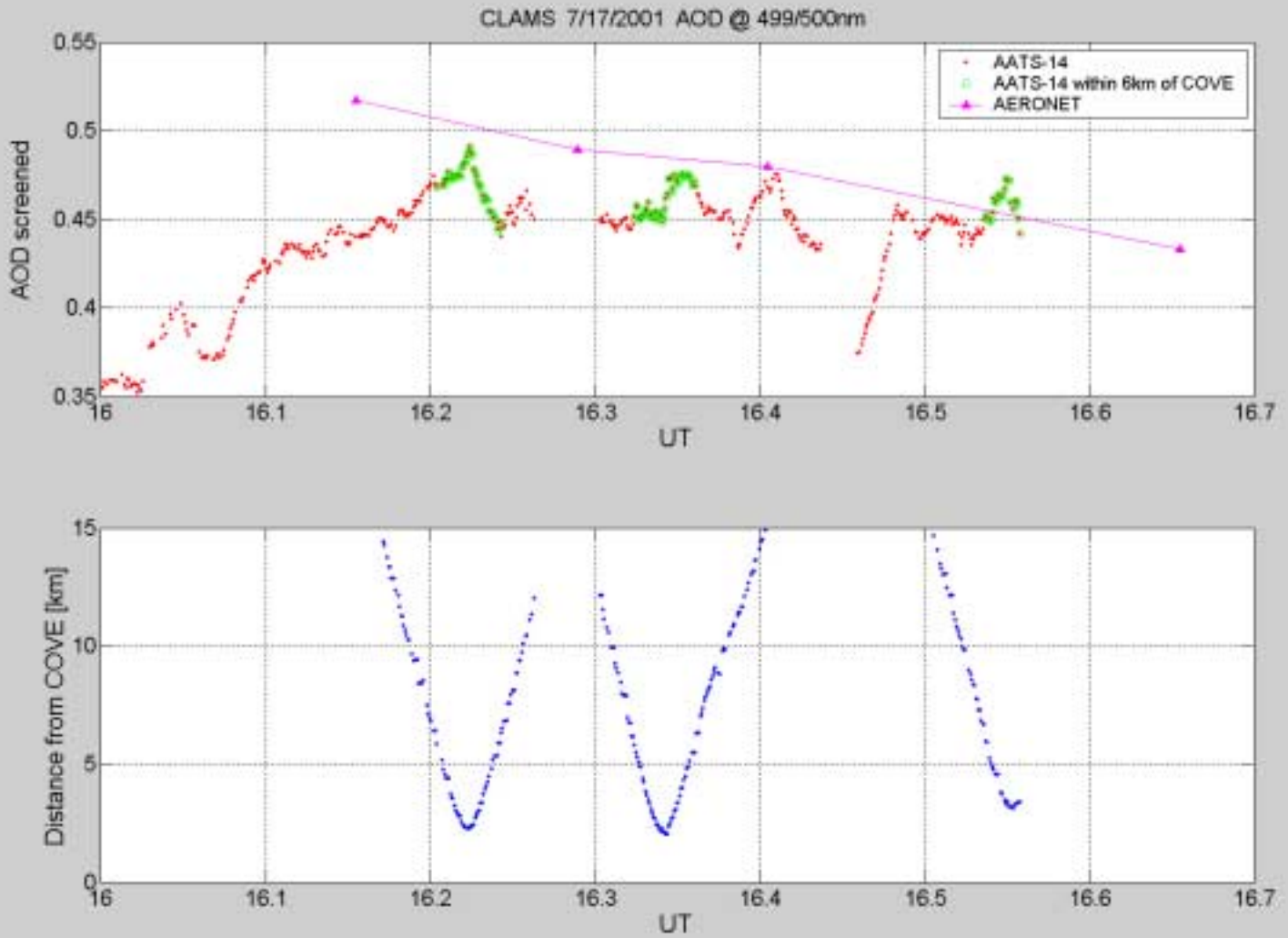
CV-580/AATS-14 location, CLAMS July 17, 2001, 16:00 - 16:15 UTC

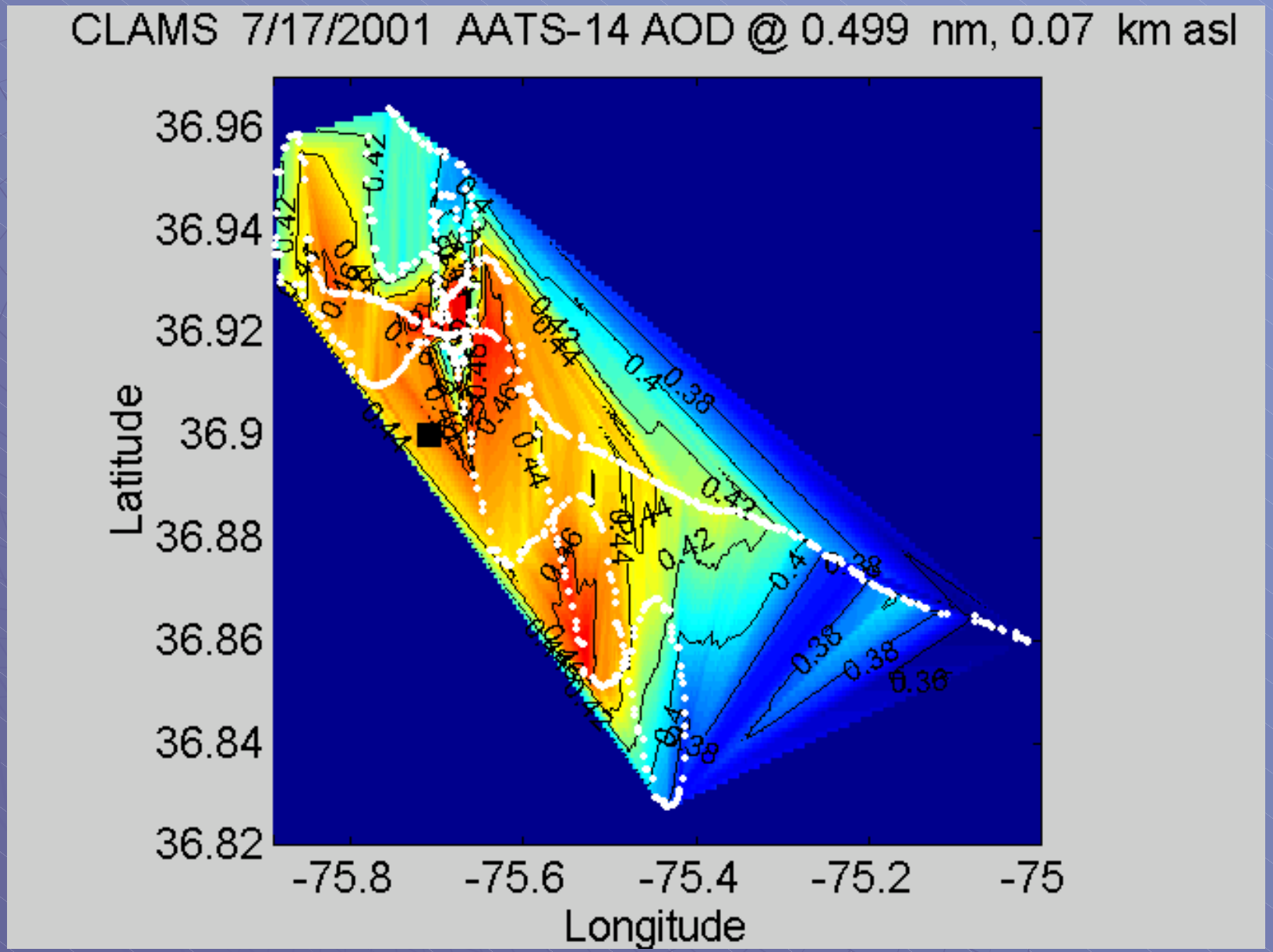


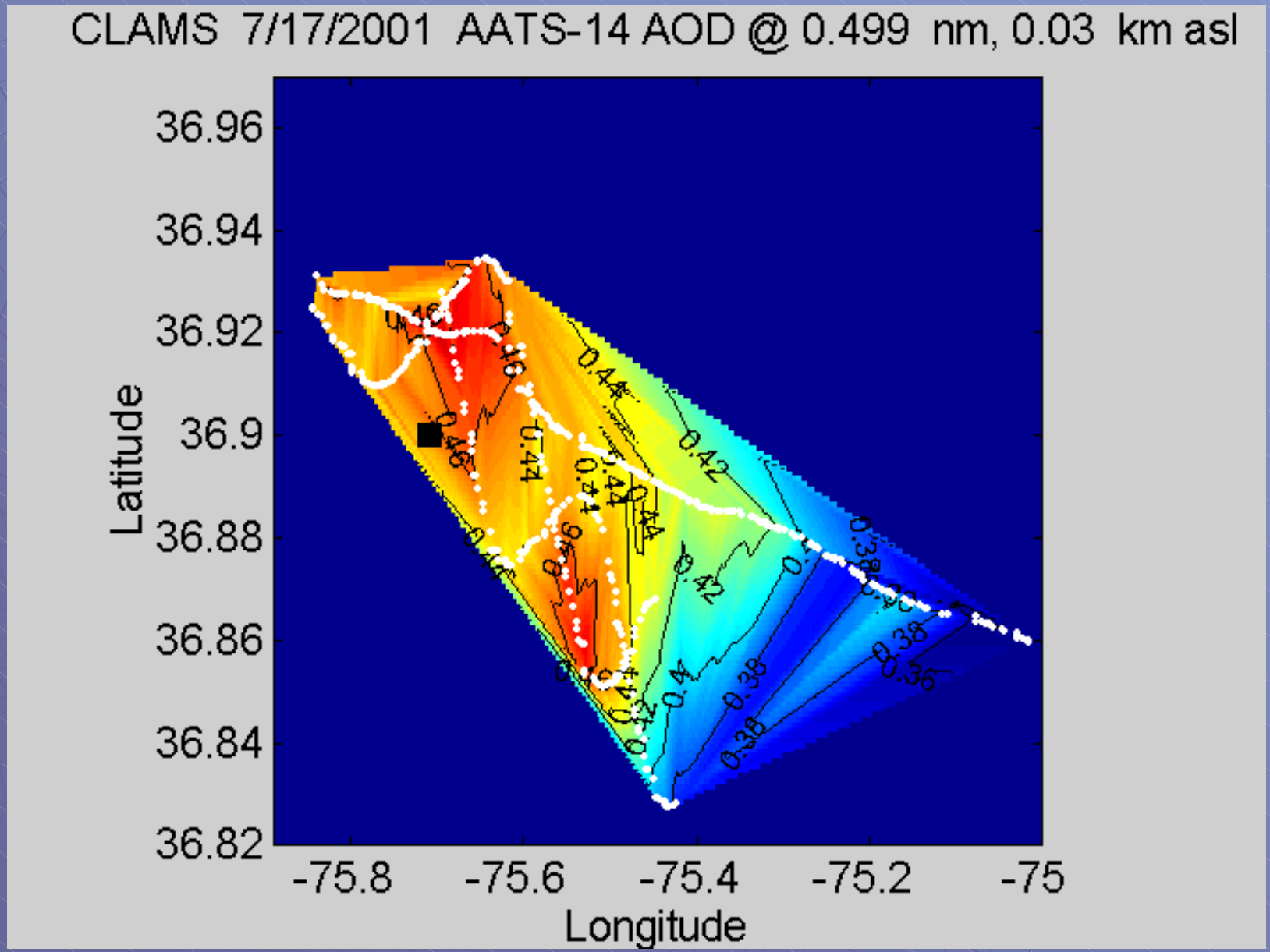
AOD variability on July 17th, 2001



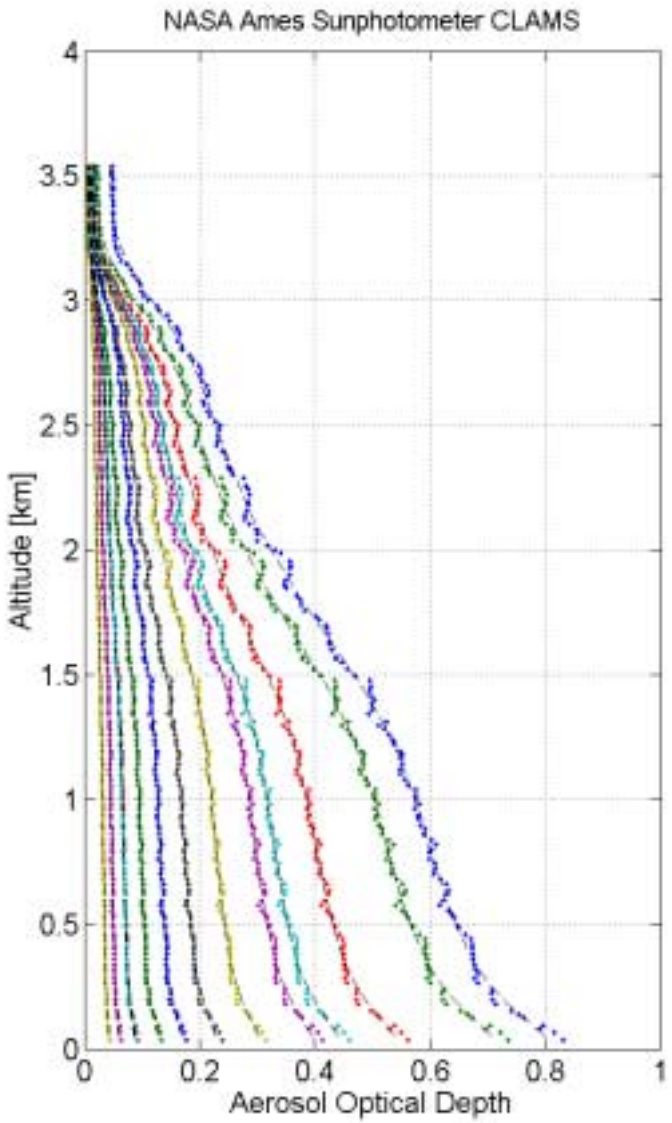
AATS-14 vs. AERONET: spatial and temporal variability

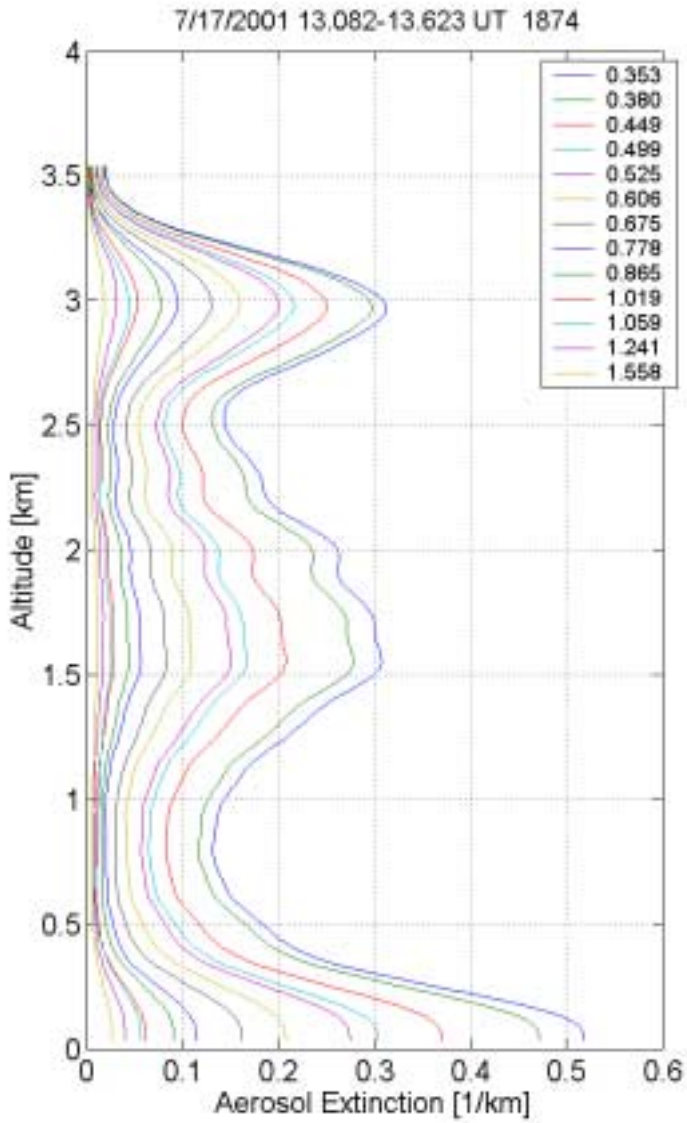



CLAMS 7/17/2001 AATS-14 AOD @ 0.499 nm, 0.07 km asl
Latitude
36.96
36.94
36.92
36.9
36.88
36.86
36.84
36.82
-75.8
-75.6
-75.4
-75.2
-75
Longitude

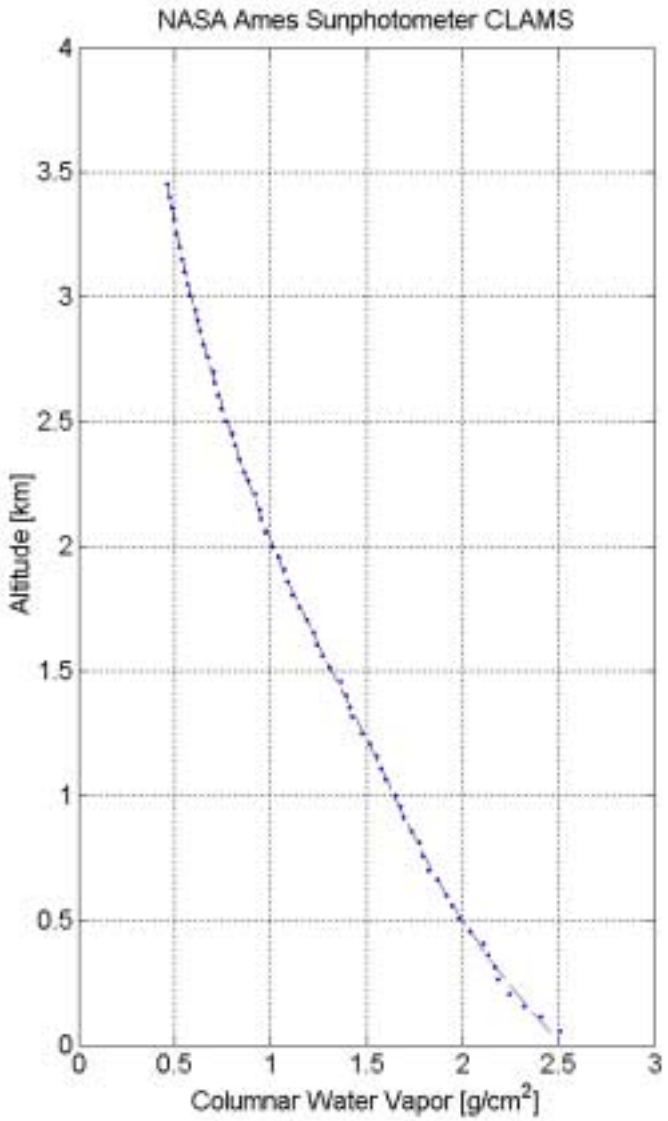

CLAMS 7/17/2001 AATS-14 AOD @ 0.499 nm, 0.03 km asl
36.96
36.94
36.92
36.9
36.88
36.86
36.84
36.82
Latitude
-75.8
-75.6
-75.4
-75.2
-75
Longitude

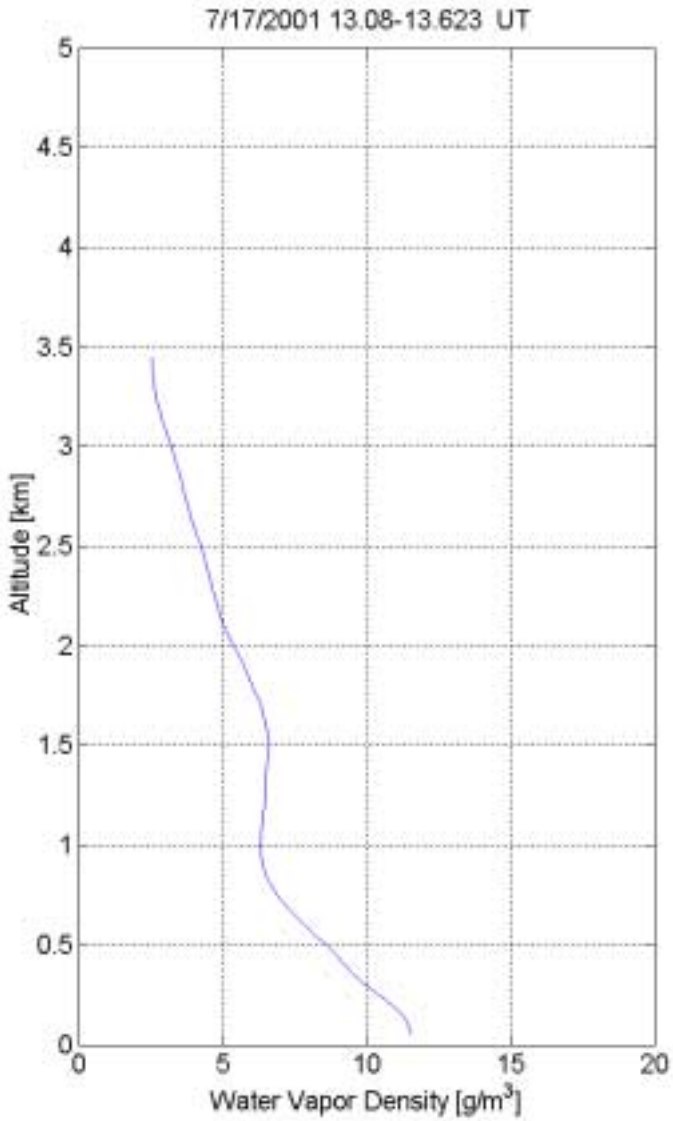
Vertical aerosol structure, July 17, 2001



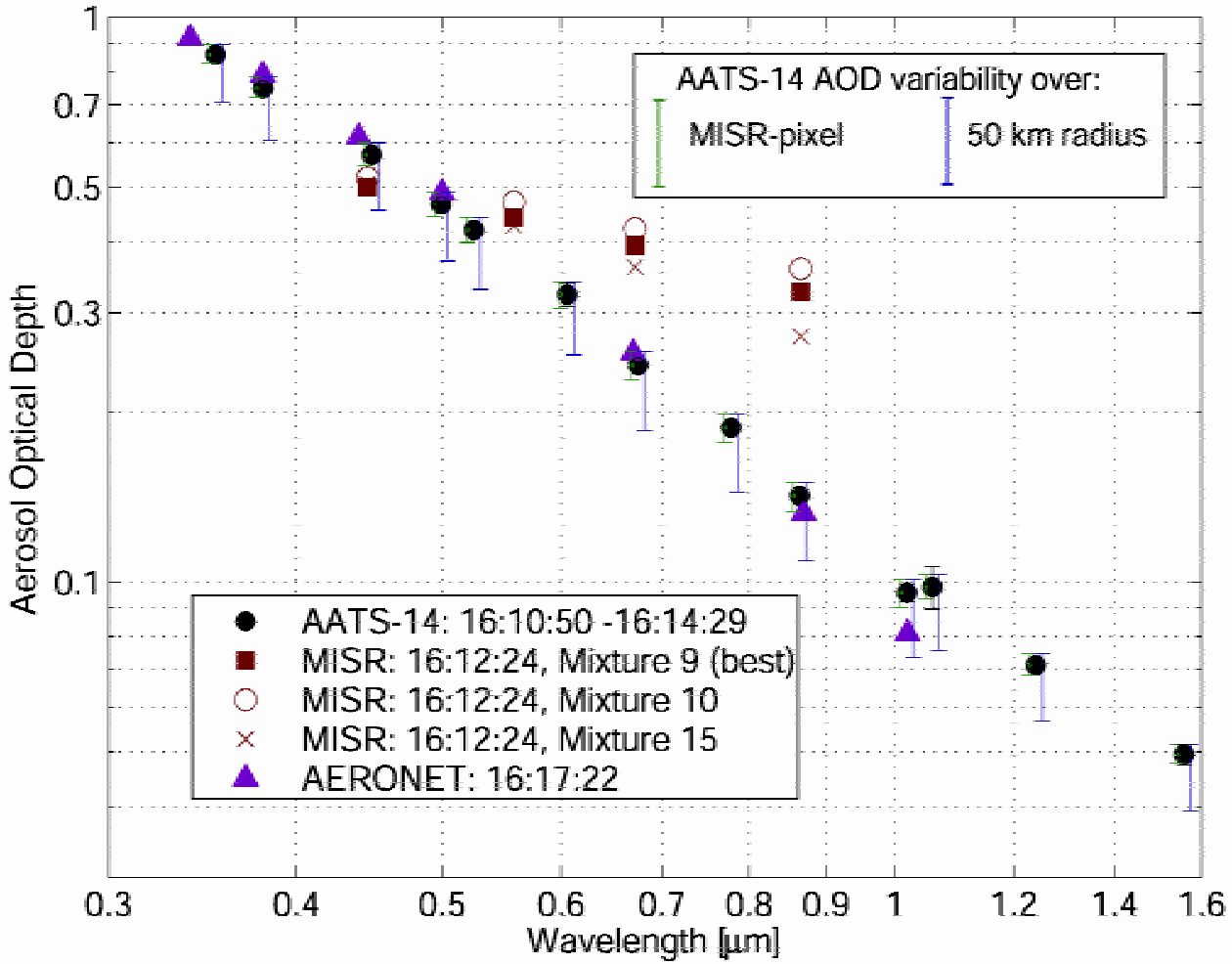


Vertical water vapor structure, July 17, 2001





Comparison between AATS-14, AERONET and MISR (unvalidated standard algorithm), CLAMS, July 17, 2001



Summary

1. AATS-14 data from CLAMS will require about 15-20Mb of archive space.
2. Available as of Feb. 23, 2002: Version 1.0 of all full-column measurements of AATS-14 in CLAMS in 11 ASCII data files (one per CV-580 flight). Call me for password info to geo.arc.nasa.gov/sgg/CLAMS/CLAMSdata/CLAMS_data_table.html
3. In CLAMS, AATS-14 measured full column aerosol optical depth spectra and columnar water vapor at exact TERRA overpass time on at least 7 occasions. For five of these opportunities, AOD at 499nm was at or below 0.1.
4. During TERRA overpass time on July 17, 2001, AATS-14 measured the highest AOD encountered during the entire experiment (~0.49 at 499nm), including a horizontal gradient in AOD of more than 0.1 over a horizontal distance of ~80 kilometers.
5. Comparisons between airborne AATS-14 in the vicinity of and AERONET Cimel derived AOD's directly at the Chesapeake Lighthouse show good agreement (and strongest correlation coefficients at 380 and 500 nm).
6. Ozone measurements at COVE?